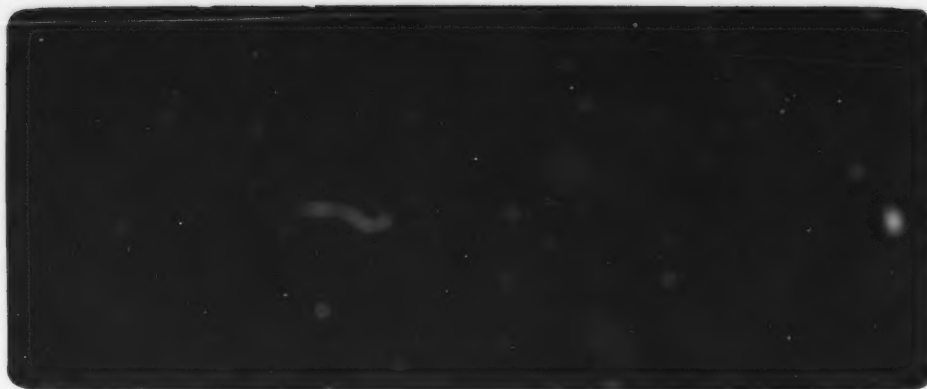




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Entente de développement
économique et régional (EDER)

**REPORT FROM THE
TASK GROUP ON FOREST PRODUCTS**

SEPTEMBER, 1989

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ACKNOWLEDGEMENT

In May 1987, a Task Group on Forest Products was established to identify and prioritize key technical strengths and constraints, prioritize opportunities and corrective measures and determine appropriate means, directions and levels of public sector support for development of the industry. With funding provided under the Canada/New Brunswick Subsidiary Agreement on Industrial Innovation and Technology Development, the Task Group was formed to bring together key leaders from industry, institutions and government. During the course of its deliberations, input was received from guest speakers, industry associations and research centres which has proven invaluable in the development of this report. We wish to thank the many individuals and institutions involved for their participation.

MEMBERS OF THE TASK GROUP ON FOREST PRODUCTS

Donald Lockhart (Chairman)	N.B. Forest Products Association Fredericton (Past Executive Director)
Erik Wang	N.B. Executive Forest Research Committee, Fredericton
Bertin Pelletier	Wood Decor Ltd., Minto
David Oxley	J.D. Irving Ltd., Saint John
Victor LeBlanc	Shorewood Furniture Ltd., Fox Creek
Jacques Couturier	Belanger Lumber Ltd., Atholville
John Torunski (Ernest Strickland)	Maritime Forest Ranger School Fredericton
Gordon Baskerville	University of New Brunswick Fredericton
Keith Steeves	Department of Commerce & Technology, Fredericton
Paul Landry	Atlantic Canada Opportunities Agency, Fredericton

EXECUTIVE SUMMARY

The work of the New Brunswick Task Group on Forest Products commenced in mid 1987, its mandate being to identify the key strengths, constraints and opportunities relating to the field of forestry and the manufacture of forest products.

The forest products industry in New Brunswick is the Province's largest industrial employer, the largest source of wages and salaries, and the largest contributor to the gross domestic product. Over 70 municipalities are dependent upon a single industry for employment. In more than one half of these cases the single industry is a forest product plant.

Industrial growth and viability is inextricably linked to the wood supply. Events in the past have resulted in a forest structure that severely limits contemporary industrial growth opportunities and will result in a significant decline in the availability of quality log material.

It will take 40-50 years to convert the existing forest to a managed forest. Wood users can be sustained only if they are able to adapt to declining wood quality and increased extraction and processing costs over the conversion period. The sawmilling industry is not sustainable in its current configuration. The supply of conventional sawlogs will continue to decline over the next 30 years. There will be little room for expansion of conventional softwood production capacity during the conversion period. Increases in economic activity in this sector will be gained mostly from further processing to increase value-added. It is assumed that the level of forest management applied to Crown lands will also be applied to large freehold land, that this level of management will be difficult or impossible to implement on small private woodlots. The implications of this caveat are very serious in that 25% of the total New Brunswick softwood supply is expected to come from private woodlots.

The 1982 forest production strategy is being revised to allow for a doubling of production by the year 2035. This will entail expanding silviculture programs in both amount and type to the point where species, density, stocking and competition are controlled on all cutover sites in turn entailing a three-fold increase in current efforts. These expanded programs will generate additional supplies of round wood by the year 2020. In the interim period, industrial growth is only possible based on: 1) Improved utilization in woods and in particular the utilization of low grade hardwood. 2) Improvements in yields from manufacturing processes. 3) Utilization of volumes of fibre in the medium term (20-25 years) from commercial thinning operations. 4) Every effort being made to increase value-added.

The immediate wood supply problem is one of quality rather than quantity. There is no silvicultural solution to this quality problem which will have measurable impact over the next 40 years. Therefore, the thrusts during this interim period must be for maximum recovery from the available quality raw material and for maximum value-added processing.

Recommendations:

1. Development for a product-specific resource evaluation

There is a need of an improved product and species-specific, geographically-referenced evaluation of the resource potential relative to mill and processing requirements.

2. Development of optimum roundwood distribution systems

Innovation in the roundwood handling process (harvesting/slashing/sorting/delivery systems) is an absolute necessity to optimize roundwood allocation in terms of mill requirements.

3. Innovation in processing technology

Implementation of recommendations 1 and 2 is essential to establish investor confidence in the security of supply necessary to stimulate capital investment in innovative technology aimed at increasing recovery and/or higher value-added.

4. Enhancement of mid-term wood supplies

Two opportunities exist: 1) intensive management of selected hardwood stands for sawlogs, and 2) commercial thinning techniques primarily in softwood plantations.

Conclusion:

The keys to sustained economic development of the forest-based industries of New Brunswick lie in increased raw material recovery and in processing for higher value-added products.

INTRODUCTION

The Canada/New Brunswick Subsidiary Agreement on Industrial Innovation and Technology Development was signed on May 28, 1986. The Agreement came about as the result of a recommendation from a study by A.D. Little entitled "New Brunswick's Science and Technology Strategy" and by a commitment by New Brunswick to technology transfer to strengthen its strategic technology resources as a means of stimulating industrial growth and employment in the Province.

The overall objective of the Agreement is to accelerate the development and application of technology to increase and enhance employment opportunities in New Brunswick. In the achievement of this objective, the Agreement strives to maximize private sector participation in the development and implementation of the Agreement, and towards this end encourages the private sector and other key participants such as the academic community by involving them through the forum of Task Groups, in the prioritization process and the establishing of strategic objectives, targets and action plans.

The A.D. Little study identified four areas of importance to New Brunswick upon which to build: (1) manufacturing and management technology development, (2) forestry and forest products development, (3) minerals and materials technology development, and (4) fisheries, food and aquaculture technology development. Task Groups were to be established to closely look at these areas and to identify and prioritize key technology strengths and opportunities.

Accordingly, a Task Group on Forest Products was formed and what follows is the report of that Task Group to the Management Committee of the Agreement. It is the strong recommendation of the Task Group that the widest possible circulation be given to the report.

THE RESOURCE

Eighty-five percent (6 million hectares) of New Brunswick's total land base is productive forest land, making it one of the most heavily forested provinces in Canada. Forty-nine percent of the land base is owned by the Crown, 20 percent by a variety of processing companies, and the balance by approximately 31,500 woodlot owners. To a large extent, the current structure of the forest has been molded by several significant biological and industrial events which have occurred over the last 70 years.

A high proportion of the resource consists of mature softwood stands which originated from a major spruce budworm outbreak occurring between 1913-1920. The current waves of budworm infestation started in 1950, and while the protection program has prevented major losses, the sustained levels of feeding have significantly reduced the vigor and longevity of the mature age class.

Past high-grading, in particular selective harvesting for both hardwood and softwood sawlogs, has resulted in the removal of high quality material more rapidly than such material has been replaced by forest growth. For example, inventory statistics indicate that the standing volume of large sawlog and veneer quality tolerant hardwoods declined by 27 percent over the period 1975-1985.

The expansion of the industry since 1952 virtually doubled the demand for raw materials. This, combined with a shift after World War II from selective high-grading to clear cutting, has resulted in the creation of substantial cutover and regenerating age classes. The fact that clear-cutting was not a wide-spread practice prior to this period explains the dearth of immature age classes to fill the gap between the mature forest and stands on the more recent cutover areas.

Harvesting operations directed primarily at softwood species, combined with the inherent aggressiveness of hardwoods in cutover conditions, has resulted in a temporary reduction in the softwood proportion of New Brunswick's forest. There was a 10 percent reduction in softwood cover types over the period 1958-1978.

These events, which provided for significant industrial expansion over the past 35 years, have resulted in a forest structure that severely limits contemporary industrial growth opportunities, and in fact will result in a significant decline in the availability of quality log material. Table 1 summarizes the current raw material supply/demand relationship.

Table 1. New Brunswick Industrial Wood Supply/Demand
(³'000 m /yr)

	Total Supply (All Sources)		Industrial Demand (1987)	
	Pulpwood and Chips	Sawlogs	Pulpwood and Chips*	Sawlogs
Softwood	4,608	4,432	4,614	4,587
Hardwood	3,294	286	1,286	305
Total	7,902	4,718	5,900	4,892

(*) Includes only imported chips as New Brunswick chip volume is part of sawlog volume.

SOURCE: NB Department of Natural Resources and Energy

Regardless of the levels of management control exerted today, it will take 40-50 years to convert this exploited, unmanaged resource, into a managed forest. The management strategy initiated in 1982 was designed to initiate the process of conversion. Several features of that conversion are crucial to the context of this report. First, fibre users can be sustained only if they are able to adapt to declining quality and increased extraction and processing costs over the conversion period. Second, the sawmilling industry is not sustainable in its current configuration. The supply of conventional sawlog material will continue to decline over the next 30 years, before it begins to recover in response to management. Third, there will be little room for expansion of conventional softwood production capacity during the conversion. Fourth, increases in economic activity in this sector will be gained mostly from further processing to increase value-added. Fifth, it is assumed that the level of management control applied to Crown lands will also be attainable on large freehold land but it is understood that this degree of management control will be difficult or impossible to implement on private woodlots. The implications of this final caveat are serious. Twenty-five percent of the total New Brunswick softwood supply is expected to come from private woodlots. As is the case on Crown Land, sustainability of the supply from this source depends on the application of proper harvest control and on implementation of an adequate level of silviculture and protection.

The 1982 forest production strategy was simple. It was based on harvesting the existing forest in a precise pattern that minimized unharvested volume losses, and planting cutovers to the extent that maximized the immediate increase in harvest. The age structure of the forest, the predicted stability of the older stands, and the predicted growth rate of plantations, set an absolute maximum rate at which the forest could be harvested. This rate was in fact slightly less than the 1982 industrial capacity. The harvest schedules and planting levels chosen in 1982 reflect this precisely. This strategy in itself has risks. Notably, if stands are not scheduled properly for harvest, or if plantations do not perform as expected, a collapse in wood supply is unavoidable. These risks apply to all ownerships equally. Barring such events, the strategy will provide for maintenance of the 1982 fibre production targets. It will not in itself however permit significant future industrial growth.

With that in mind, and recognizing that in the long-term the New Brunswick forest products industry must grow at a rate which will parallel expected increases in world demand, the 1982 strategy is being revised into a more complex schedule to allow for a doubling of production by the year 2035. This will entail expanding silviculture programs in both amount and type to the point where species, density, stocking and competition are controlled on all cutover sites; entailing a three-fold increase in current efforts. These expanded programs will generate additional supplies of raw material starting in the year 2020.

In the interim period, industrial growth is only possible based on: 1) Improved utilization in the woods must result in not only less volume left behind during operations, but also increased salvage of low volume scattered stands, currently considered to be inoperable by conventional standards. In particular, the hardwoods left standing in cutovers pose an obstacle to increased silvicultural activities. It becomes imperative to utilize this volume of low grade hardwood. 2) Improvements in yields from manufacturing processes provide an additional opportunity to increase industrial output, as are opportunities for increased production if manufacturing processes can be adapted to utilize other species. 3) In the medium term (in 20-25 years time) substantial additional volumes of fibre are expected to be generated from commercial thinning operations in managed stands. 4) In the context of 1, 2 and 3 every effort should be made to increase the value-added part of the industry.

The crucial point is that the ability of the industry to expand its traditional manufacturing capacity in this interim period will be severely constrained by the economic supply of quality raw material. At the same time if industry is to survive this period and be in a position to capitalize on the substantial increase in quantity and quality of raw material from the new forest, manufacturing output will have to remain viable in value. Therefore, the thrusts during this period must be for maximum recovery from the available raw material, and for maximum value-added processing.

Taken as a whole, this strategy will provide the opportunity for the forest products industry in New Brunswick to grow at a rate which will parallel (although lag behind) the expected increase in world demand. It is essential to recognize that both the short and the long-term measures are necessary to hit the target. We cannot substitute increases in the silviculture program with the interim measures described, and still expect to achieve the target. In fact, some of these interim sources of supply such as volumes from commercial thinnings are dependant upon prompt initiation of the expanded program.

All of the above efforts are essential elements in a strategy to double New Brunswick's raw material supply by the year 2035. Figure 1 depicts the anticipated increases in raw material supply which will be generated by this strategy.

Constraints and Opportunities - Resource

The immediate wood supply problem is one of quality, rather than quantity. In general, there is no silviculture solution to this quality problem which will have measurable impact over the next 40 years. This is because it is not possible to improve the quality of the old forest in the time span over which it will be liquidated. There are two apparent exceptions. The first one exists in the case of the tolerant hardwood resource, where proper application of the selection system (not high grading) offers the potential (as yet unquantified) to increase the yield of quality sawlog/veneer material over a 20 year period. This is the only forest condition where an unevenage system of management is realistic. The second opportunity lies in the volumes of fibre (as yet unquantified) which could be generated from commercial thinnings in managed stands over the next 20-30 years. In Finland for example, 60 percent of the annual fibre supply is generated from intermediate cuttings.

In the longer term (40-50 years) substantial increases in economic fibre supply (quality and quantity) are possible. The timing and degree of expansion depends entirely on the types and levels of silviculture activities initiated today.

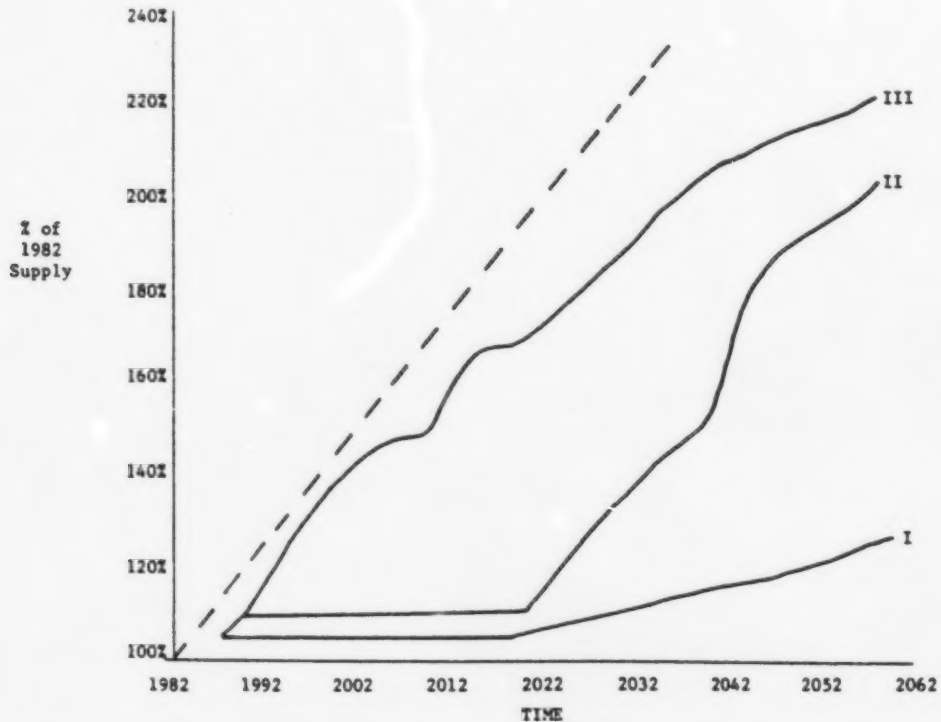


Figure 1. Anticipated future availability of raw material in New Brunswick

- Scenario I maintain current utilization standards and silviculture programs which treat approximately 40% of cutovers.
- Scenario II maintain current utilization standards but expand silviculture programs to treat all cutovers.
- Scenario III implement all tactics in proposed strategy.
- projected demand (to maintain market share)

THE INDUSTRY

Industrial growth and viability is inextricably linked to the resource. The constraints posed by the current resource characteristics make it essential to look to increased recovery and value-added as the primary means to increase economic activity in this sector.

The forest products industry in New Brunswick is the Province's largest industrial employer, the largest source of wages and salaries, and the largest contributor to the gross domestic product. In 1987 the forest products industry in the province provided more than 17,000 direct jobs. The industry provided salaries and wages of approximately \$382,000,000. Economic studies indicate that each forest industry job supports 2.5 other jobs totalling approximately 59,500 New Brunswick employees being supported by this industry, contributing more than \$1,336,000,000 in total salaries and wages to the provincial economy.

Activities in this sector include both the management, harvesting and delivery of timber, as well as the processing of this timber into manufactured products, from sawn rough lumber to finished furniture, and from pulp to finished paper products. The wood industries, which include sawmills, planing mills, shingle mills, veneer and plywood mills, sash, door and other millwork plants and particleboard plants, generally produce solid wood products sawn from logs. The paper and allied industries, which include pulp and paper mills, cartons, boxes, paper bags and other paper converting plants, produce products based on the pulping of timber into wood fibre.

Logging Industry

Approximately 96 percent of the wood harvested in New Brunswick is processed within the province. In addition, substantial volumes are imported from neighbouring jurisdictions, making New Brunswick a net importer of roundwood. Table 2 summarizes the sources of wood currently used by the New Brunswick industry.

92 percent of the total available wood supply is consumed by the 8 major forest products companies (Crown Land Licencees) in New Brunswick. The balance supplies a large number of small firms.

Table 2 Consumption of Roundwood and Chips by New Brunswick
Forest Industry - 1987/1988
('000 M)

	Pulpmills		*Other Wood Users		Total	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Roundwood N.B.	3514	1286	4383	229	7897	1515
Roundwood Imports	300	--	204	76	504	76
Chips N.B. **	2291	47	--	--	2291	47
Chips Imports	800	--	--	--	800	--
TOTAL	6905	1333	4587	305	11492	1638

* Mainly sawmills

** Represents chips generated by Other Wood Users

Source: DNR Timber Utilization Survey (April 1/87- March 31/88)

Wood Industries

The wood industries group is dominated by sawmilling. There are 97 sawmills in the Province whose operations are considered to be at a commercial level. Table 3 provides a summary of mills by productive capacity. Fifty-three percent of the Province's sawmilling capacity is owned by the pulp and paper industry as part of integrated operations. All but one of the mills with capacities in excess of 25 million f.b.m. annually are owned by integrated companies. While the sawmill industry requires 49 percent of the total roundwood delivered to the processing industry, less than half of this volume is actually converted into solid wood products. The balance (28 percent) is converted to pulpwood chips and sawmill residue. Almost one third of the production of the wood industries group is marketed internationally, including almost one half of the timber production. While the U.S. continues to be the major export market, its share has declined to less than 40 percent of the New Brunswick total, while the U.K. share has increased to 36 percent of the lumber exported.

Table 3 Summary of Mills by Productive Capacity
(Millions of Boardfeet)

Capacity	Number of Mills	Total Production	%
+50	5	302	40
35-50	2	85	11
25-35	2	52	7
15-25	2	40	5
10-15	7	82	18
5-10	13	97	13
2-5	18	56	8
< 2	<u>48</u>	<u>37</u>	<u>5</u>
	97	751	107

Source: DNR Timber Utilization Survey (April 1/87-March 31/88)

In the wood industries the value of shipments increased in the 1970's by 63 percent, value added by 58 percent and exports by 125 percent in real terms. Lumber production reversed the declining trends of the late 1960's and reached a level of 696 million board feet in 1980. Production volume increased by almost one third over the decade of the '70's. While the number of mills declined and employment decreased, major investment in industry, particularly in mills owned by the pulp and paper companies, resulted in major expansions of capacity in the larger mills. As a result productivity and total wood fibre utilization increased (Table 4). The growth of the wood industries as a group, in the area of employment and value added, resulted mainly from expansion in shingle and plywood production and the addition of a waferboard plant.

Table 4 Historical Sawmill Consumption in New Brunswick

	Consumption (m ³ per year)	Production mbf	Number of Mills Operating
1975	3,140,000	515	131
1980	4,244,000	596	122
1987	4,408,000	751	97

Source: DNR Timber Utilization Surveys

While the decline in the number of sawmills is offset by increases in production in integrated operations, the potential impact of the decline in local sawmills on the provincial economy is significant. Over 70 towns in New Brunswick are dependent upon a single industry for employment. In more than half of these cases the single industry is a forest products plant, usually a sawmill As stated earlier, a fall-off in conventional sawlog supply over the next 25 years is inevitable. This will accelerate the reduction in the number of sawmills, as the decline in quality and quantity of logs and increasing costs will reduce the competitiveness of individual mills, both domestically and in export markets. Increases in recovery and value-added are essential to minimize this trend.

In addition to conventional sawlogs, raw material shortages are expected in the veneer, oriented strand board and cedar shingle industries, as well as secondary manufacturers of furniture, cabinets and flooring. In all cases, the supply concern relates to securing a local, economic source of the appropriate species and quality classes. In some cases the appropriate roundwood exists, in the stems of standing trees somewhere in New Brunswick. However, current harvesting, slashing, sorting and transportation systems apparently limit access to this raw material.

Pulp and Paper Industry

The paper and allied industries group is the largest processing component, employing almost 60 percent of those working in forest-based processing, and contributing 70 percent of the value of output. There are 10 major pulp and paper mills operating in New Brunswick. Five of these are part of operations generating finished products (newsprint and fine papers). The remaining five are primarily involved in the manufacturing of commodities such as woodpulp and corrugating medium, which are sold on the open market for further processing and value-added. The pulp and paper industry utilizes 79 percent of the total wood fibre required by primary processing plants in the Province of which 84 percent is softwood and 16 percent is hardwood. New Brunswick pulp and paper production is almost entirely dependent on international markets (90 percent by value) of which the U.S. accounts for 49 percent and the U.K. and Western Europe 18 percent of the total exports.

During the 1970's, the paper and allied industries experienced significant expansion. Values of output, employment, exports and timber utilization all increased. The value of shipments increased 42 percent, value added and exports increased by 63 percent in real terms. Employment growth was modest. Most of the pulpmills have recently undertaken or completed major modernization programs. The investments have been directed towards pollution abatement facilities, energy reduction and oil substitution, and improved productivity. In several cases the development of integrated pulp and paper operations has increased end-product value and reduced the impact of fluctuation in market pulp supply/demand.

The impact of declining roundwood quality discussed earlier is not restricted to the solid wood products industry. The sustained budworm infestation in stands which are advancing in age, is causing a steadily increasing proportion of budworm damaged round wood in the total raw material supply to the pulp and paper industry. This impacts directly on the delivered wood cost and on quality of products produced, and therefore on the competitiveness of the industry. The impacts include: 1) reduced yield due both to breakage losses in the woodroom, and to lower density, 2) reduced strength, and 3) lower brightness. Yield reductions of 15 percent and strength reductions of 10 percent are expected. The results are higher pulping and bleaching costs, lower quality products, and higher consumer resistance, particularly when markets are soft. Problems are most pronounced in the groundwood process, but extend into sulphite and Kraft processes as well. The most common concern relates to debarking difficulties, and resultant breakage.

Short of major, capital intensive conversions to less sensitive pulping processes such as Thermo-Mechanical Pulp, the only ready solutions appear to be in improved wood sorting, handling and debarking, to minimize breakage and direct the best quality pulpwood to the processes such as groundwood which are most sensitive to poor quality roundwood. As well, pulpwood which does not even meet minimum standards needs to be sorted out before it reaches the mill woodrooms, and diverted to uses such as energy.

In addition to quality and quantity of supply, the pulp and paper industry in New Brunswick faces high energy costs in relation to the rest of Canada. Two options exists, namely; 1) lower the cost of energy, and 2) introduce technology requiring less energy consumption. Lowering energy cost is a provincial policy decision and has the potential for significant improvement in the competitive position of the New Brunswick forest industry. Energy conservation is an area where Scandinavian technology might help the New Brunswick industry.

As is the case with the sawmilling industry, sustainability of the pulp and paper industry in the face of declining wood quality and increased processing costs, will depend upon best possible recovery of raw materials, and processing for maximum value-added.

Constraints and Opportunities - Industry

There are three overriding constraints which could limit further growth and increased profitability of the forest products industry in the short term, and they apply to both wood products and pulp and paper sectors. They are: 1) the nature and current structure of the resource, 2) our ability to extract, sort and deliver roundwood (to the extent that it exists in the resource) which best matches the requirements of individual mills, 3) the technology to manufacture higher value-added products from this roundwood. As stated in the Resource Section of this report, constraint number 1 is intractable, with the exceptions noted. Of the remaining two constraints, number 2 is currently limiting. Technological developments in mills to relax constraint 3 are possible, but will only occur if there is investor confidence in consistent access to appropriate raw materials, which requires a relaxation of constraint number 2. This in turn is dependent upon two developments, first an improved product and species-specific, geographically-referenced evaluation of the resource potential relative to mill requirements, and second, a more innovative approach to wood handling, designed to optimize roundwood allocation according to mill requirements. In short, removal of the wood handling constraint would allow us to take advantage of improvements in mill technology, up to the limits imposed by the condition of the resource. Investment in mills will only occur if security of supply is available.

RECOMMENDATIONS

Past expansion strategies based on increasing output of traditional commodities are no longer feasible. The keys to improved productivity and industry sustainability lie in increased raw material recovery and value-added processing. The recommendations which follow were developed in this context.

In the preceding Sections, a number of constraints to increased productivity were identified. These constraints are: 1) our knowledge of the availability and distribution of specific roundwood products, 2) our ability to economically extract and deliver this material to the appropriate manufacturing facility, 3) improved manufacturing technology to manufacture higher value added products from the available raw material, 4) our ability to change the structure of the resource over the next 40 years in order to increase the long term availability of an economic raw material supply. While removal of the first three constraints would provide almost immediate benefits, relaxation of the fourth constraint will take 30-40 years, and will only occur if the appropriate management efforts are exerted today and maintained consistently over this period. While opportunities to remove these constraints exist, the timing of benefits varies significantly. Even in the case of the first three constraints (resource understanding, improved roundwood handling and improved processing technology), where removal could generate almost immediate benefits, the order of removal is critical, and follows the principle of limiting factors, i.e. removal of a constraint will have no effect unless removal of all more limiting constraints occurs first. Specifically, improvements in processing technology will have little benefit unless the roundwood handling systems are in place to generate the appropriate raw materials for the process. In fact, capital investment, unless heavily subsidized, will not occur without investor confidence in security of supply. This appears obvious, but there is a real danger that this principle will be ignored in the rush to find technological solutions. This sequence of constraint removal is absolutely critical, if increased productivity is to be achieved.

A final cautionary note relates to balancing the benefits of the economies of scale from capital-intensive large operations, against the employment benefits in labor-intensive smaller operations. As stated earlier, over 80 percent of the provincial wood supply is consumed by the 8 major forest products companies, who could quite readily absorb the balance of the provincial wood supply currently utilized by the small sawmills, if it were made available. This would have some positive effect on the competitiveness of these large companies, although the marginal effect would probably be comparatively minor. In contrast, the net provincial impact of such a move would be large and negative, forcing a search for alternate sources of employment and revenues in those single-industry towns affected. While a detailed socio-economic analysis of this trade-off is well beyond the scope of this report, it needs to be considered in any strategy which ultimately will alter the current mill configuration.

With the above concerns in mind, the following recommendations are offered for consideration.

1. Development of a Product Specific Resource Evaluation

Wood supply analyses conducted in 1982, and updated in 1987, have provided a reliable forecast of future availability of softwood fibre in New Brunswick, and have enabled forest managers to determine the maximum, non-declining softwood harvest sustainable in the long term (80 years). However, little insight has been provided as to the future economic availability of roundwood (softwood and hardwood), suitable for solid wood products manufacturing, in particular those products with higher value-added components than traditional commodities. As a prerequisite to any substantial capital investment in the solid wood products industry, the Task Group recommends that the Province of New Brunswick undertake a product-specific evaluation of future economic raw material availability.

Processing technology (constraint #3) must be made consistent with both the roundwood characteristics expected over the life of the plant, as well as the volume of that material which can be relied upon over the same period. Therefore, to be useful, the supply analysis must provide insight into the relationship between roundwood specifications (species, size, quality) and long term economic volume availability. In addition, the analysis must take into account regional variations in availability of such material, with respect to maximum economic hauling distances from logical processing locations.

The Departments of Commerce and Development and Natural Resources and Energy should collaborate on the development of such an analysis. Initially, an evaluation of similar efforts which have been undertaken in other jurisdictions, notably British Columbia, would provide valuable direction.

2. The Development of Optimum Roundwood Distribution Systems.

Innovation in the roundwood handling process (harvesting/slashing/sorting/delivery systems) is an absolute necessity to optimize roundwood allocation in terms of mill requirements. The Task Group recommends that a review of the existing roundwood sorting and allocation systems be undertaken, in order that opportunities can be identified to improve the direction of roundwood to the most appropriate specific manufacturing processes. In evaluating these wood handling systems, it is essential that the specific, incremental cost associated with generating a particular type of log is borne directly by the product manufactured from that log, and is not distributed across all products. For example, if the delivered cost of 100 cubic metres of conventional sawlogs is \$X, and the extra cost associated with converting 10 cubic metres of this volume in to short bolts is \$Y, then this extra cost must be borne entirely by the processing of the 10 cubic metres of boltwood. The final end product value must be sufficient to absorb this extra cost. Motivation to optimize roundwood allocation must be economic, rather than regulatory. This requires a clear connection of raw material processing costs to final products.

There are many elements to improving wood recovery, and improvements could be sought anywhere from training programs for fellers and buckers, to introduction of concentration yards to provide for more efficient sorting/delivery systems. It is notable that, in those regions of the world which support a very diversified forest products industry (ex. Finland and N.E. United States), such distribution systems have evolved to support such an industry. Initially, these systems should be evaluated to determine how they might be applied in New Brunswick. An appropriate "site visit" group should be structured to undertake this evaluation.

It should be recognized, that the product specific resource evaluation is a necessary precursor to addressing improvements in roundwood distribution.

3. Innovations in Processing Technology

Implementation of recommendations 1 and 2 is essential to establish investor confidence in the security of supply necessary to stimulate capital investment in innovative technology aimed at increasing recovery and/or higher value-added. To be sustainable, the incentive for such investment must be profit-driven, not government subsidy-driven. Public funds should be used to ensure that economic benefits to the private sector are sustainable, not used to sustain these benefits through direct subsidies. These funds should therefore be used to support infrastructures such as research and development and training programs and facilities, to which industry can turn for expertise in improving processing technology specific to individual plants. To be cost effective, public funds should not be used to subsidize the capital costs of installing proven technology in manufacturing plants.

In the area of public funding for research and development, a distinction should be made between efforts which generate benefits to the sector as a whole, versus benefits accrued by a specific company. In the former precompetitive case involving collective benefits, the cost of research/development/training should be covered at least in part by public funds. In many cases, R and D facilities such as Paprican and Forintek could provide the necessary environment, provided that they are adequately represented within New Brunswick. In addition, the development of a Pulp and Paper Engineering degree granting capability in the Province would help to train professionals in applying state-of-the-art processing technology to the pulp and paper industry.

The competitive category includes the true proprietary forms of research, designed to give a specific company a distinct edge on the competition. The incentive to undertake such research must be profit-driven, and the expenditure of private funds must be justified on this basis. Public expenditure in this case should be directed at developing facilities, fully accessible to industry as a whole, and operated as a place to carry out proprietary research on a company-by-company basis.

The same rationale (precompetitive vs. competitive) should be applied to address training requirements for the industry. Public funds should be used to develop and expand training facilities appropriate to industrial needs (large and small). Training is an integral part of the process of developing and transferring new processing technology to the manufacturing sector. The facilities to do this exist in the form of the Maritime Forest Ranger School, in particular the training sawmill, as well as the extension programs within Universities and Community Colleges. However, if an industry large or small is to capitalize on the competitive edge provided by technological innovation, it must be able to rapidly gear up to employ this technology. Therefore, specialized training programs must be developed quickly if the above institutions are to respond to this demand.

4. Enhancement of Mid-Term Wood Supplies

As discussed in the Resource Section, two opportunities do exist to improve the quality of the wood supply in the short term. These relate to intensive management of selected hardwood stands for sawlogs, and commercial thinning techniques primarily in softwood plantations. Both require a combination of operator training and equipment development. Both are also only viable if the added costs (on an operational basis) can be borne by the value of products generated. These systems are being tried on an experimental basis in several parts of the province. Financial support should be provided for the continued development of these silvicultural systems. To repeat, these opportunities are limited in extent and impact. They nevertheless do exist and should be pursued.

CONCLUSION

The keys to sustained economic development of the forest-based industries in New Brunswick lie in increased raw material recovery and in processing for higher value-added products. There are significant constraints, and related opportunities, with respect to this. Internal processing-related constraints are inextricably connected to problems of wood supply, the latter relating primarily to quality of raw material and delivered wood cost. Any strategy for technologically-based economic development must be consistent with this relationship.

Beyond the year 2020, supply constraints will start to relax as a result of today's forest management efforts. However, in the interim period supply problems can only be addressed by technological innovation aimed at economic recovery of usable material from the existing resource.

Equally important to wood supply in the economic survival and development of industry will be access to technologies that improve utilization of raw material that is delivered. Such innovation is essential to the survival of a substantial proportion of smaller mills which collectively form a fundamental support for a large number of small communities.

In relaxing constraints to industrial development, the sequence is critical. An improved definition of resource potential relative to specific roundwood products must precede the development of improved roundwood distribution processes. Both are essential to generate investor confidence in security of supply which is a prerequisite to any profit-driven capital investment in improved processing technology.

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